Abstract Submitted
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**Transient-Free Operations With Physics-Based Real-time Analysis and Control**[1] EGEMEN KOLEMEN, Princeton University, KEITH BURRELL, GA, WILLIAM EGGERT, DAVID ELDON, Princeton University, JOHN FERRON, GA, ALEX GLASSER, Princeton University, DAVID HUMPHREYS, GA — In order to understand and predict disruptions, the two most common methods currently employed in tokamak analysis are the time-consuming kinetic EFITs, which are done offline with significant human involvement, and the search for correlations with global precursors using various parameterization techniques. We are developing automated "kinetic EFITs" at DIII-D to enable calculation of the stability as the plasma evolves close to the disruption. This allows us to quantify the probabilistic nature of the stability calculations and provides a stability metric for all possible linear perturbations to the plasma. This study also provides insight into how the control system can avoid the unstable operating space, which is critical for high-performance operations close to stability thresholds at ITER. A novel, efficient ideal stability calculation method and new real-time CER acquisition system are being developed, and a new 77-core server has been installed on the DIII-D PCS to enable experimental use.

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